Name:

at1117paper: Complete the Square (v306)

Example

A square's edge length is x feet. A rectangle has a height of x feet and a width of 48 feet. Their combined area, found by adding the square's area and the rectangle's area, is 868 square feet. What is the value of x?

Example's Solution

$$x^2 + 48x = 868$$

To complete the square, add $\left(\frac{48}{2}\right)^2 = 576$ to both sides.

$$x^2 + 48x + 576 = 1444$$

Recognize the left side is now a perfect-square trinomial. Factor the left side.

$$(x + 24)^2 = 1444$$

Undo the squaring.

$$x + 24 = \pm\sqrt{1444}$$

$$x + 24 = \pm 38$$

Subtract 24 from both sides.

$$x = -24 \pm 38$$

In this geometric example, we are only concerned about the positive solution. So,

$$x = 14$$

Question 1

A square's edge length is x feet. A rectangle has a height of x feet and a width of 48 feet. The total area, of the square and rectangle, is 720 square feet. What is the value of x?

$$x^2 + 48x = 720$$

$$x^2 + 48x + 576 = 1296$$

$$(x + 24)^2 = 1296$$

$$x + 24 = \pm 36$$

$$x = 12$$

Question 2

A square's edge length is x feet. A rectangle has a height of x feet and a width of 56 feet. The total area, of the square and rectangle, is 980 square feet. What is the value of x?

$$x^2 + 56x = 980$$
$$x^2 + 56x + 784 = 1764$$
$$(x + 28)^2 = 1764$$
$$x + 28 = \pm 42$$
$$x = 14$$

Question 3

A square's edge length is x feet. A rectangle has a height of x feet and a width of 36 feet. The total area, of the square and rectangle, is 700 square feet. What is the value of x?

$$x^2 + 36x = 700$$
$$x^2 + 36x + 324 = 1024$$
$$(x + 18)^2 = 1024$$
$$x + 18 = \pm 32$$
$$x = 14$$